This is the published version:

Burch, Tony 2006, The availability of information in knowledge-based economies, in
Integrating “doing” and “thinking”: KM as reflective practice: proceeding of the Ninth
Australian Conference for Knowledge Management and Intelligent Decision Support:

Available from Deakin Research Online:

http://hdl.handle.net/10536/DRO/DU:30018300

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Abstract
The use of information is preceded by its availability. For post-industrial economies to exploit information to full potential it is important for knowledge to be free of vested-interest censorship and manipulation. History suggests that a range of vested-interests have manipulated explicit information availability through various forms of sectarian, state and business manipulation of the systems of information storage and transfer. The OECD 1996 report "The Knowledge-Based Economy" recognized that the diffusion of knowledge was as significant as its creation, and that knowledge distribution networks were crucial to innovation, production processes and product development. The success of enterprises and national economies is considered reliant on the effectiveness of their ability to gather, distribute and utilize knowledge. The increasing need for ready access (of information that might become knowledge) in accordance with the OECD definition is particularly relevant to this paper as it assumes infrastructures capable of providing that need. Wherever there are infrastructures there are opportunities to benefit from them, either for profit or power. This paper considers the implications of sectarian, state and business-model control over the selective content, storage and dissemination of information and knowledge, both from historical and current perspectives. The advent of new technologies and how they have enabled the flow of information adds new dimensions to knowledge control but the quality of knowledge is less certain and who controls or influences distribution of knowledge less transparent. It could be argued that at each step in the development of knowledge distribution networks, knowledge and its distribution, is not free of the possibility of third-party vested interest.

Introduction
In a general sense, knowledge is a much sought after commodity considered both desirable and necessary for enlightenment, advancement or entertainment. While what constitutes knowledge, whether knowledge is explicit or implicit, and how history has been complicit in deliberate or unwitting censorship and many other related issues may be debated, it is evident that vested interests have impacted and shaped the flow of information over time. Whilst not all information becomes knowledge this paper assumes that the sophisticated information/knowledge storage and transfer publishing systems (knowledge distribution networks) that have developed through the last 500 years have, as a prime focus, the offer of knowledge or the offer of information that might be converted into knowledge. Thus such systems have been integral to the spread of knowledge through societies and, in accordance with the OECD Knowledge-based

1. The author acknowledges the positive contribution of two anonymous referees to a re-focusing of this paper.
2. This paper excludes consideration of the manipulation of tacit knowledge.
Economy report (OECD 1996), such systems or their replacements are crucial to innovation, production processes and product development.

The importance of knowledge to a nation was referred to by Winston Churchill, who was reputed to have observed in 1943 during an address to Harvard University "(t)hat the empires of the future will be the empires of the mind" (Nelson 2005). Boisot and Canals (2004) suggest that since the middle of the twentieth century it is acknowledged that information is the generator of wealth in post industrial societies. More recently, the OECD glossary of statistical terms defines the 'knowledge-based economy' as:

(a)n expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skills levels, and increasing need for ready access to all of these by the business and public sectors.

The increasing emphasis in literature on knowledge-based economies would suggest that this is a new paradigm, where knowledge has suddenly become valuable and an essential component of advanced economies. Yet there is no internationally agreed framework to measure just how much a society or economy is knowledge-based (ABS 2002). Nor are there solutions to how some forms of knowledge might be valued as capital. For example, US GAAP (General Accepted Accounting Principles) and the recently Australian adopted IFRS (International Financial Reporting Standards) both struggle with accounting for some forms of intangibles, and any useable formula for valuing knowledge as a balance-sheet item is unlikely in the foreseeable future. Thus, if this is a new paradigm then, at the level of society it is difficult to measure and, at the level of the firm, is difficult to recognize in capital terms.

Whilst it might appear to be a new paradigm, the concept of a knowledge-based economy has historical foundations. In Europe the advent of the Gutenberg printing press in the mid fifteenth century AD began a technological revolution and, it could be argued, the beginnings of the industrial revolution. Agrarian societies began moving toward becoming technological societies, based on processes that could store knowledge and make it widely available to increasingly literate communities. One could argue that this creation of a massive supply-chain for the availability and dissemination of information and knowledge conforms to Foucoult's (1972) theory of "epistemological acts and thresholds", as it quickly eclipsed the scribed codex and provided a revolutionary new form of the storage and dissemination of information. The printing and publishing industry and the rise of library systems provided an exponential growth in the amount of information and knowledge available for diffusion and distribution.

During the 500 years since Gutenberg the importance of knowledge and the systems of knowledge storage and transfer cannot be underestimated. One measure of the perception of that importance is how vested interests have strived to control it. Extraordinary measures have been taken by Sectarian and State powers to control the systems that stored and disseminated information and these will be discussed in more detail later in this paper. In more recent times mass-production technology has introduced economic business models that have unwittingly controlled some knowledge by limiting its dissemination, yet increased dissemination of other knowledge that met the
economic requirements of the business model. In such cases the veracity and degree of importance of the product, the knowledge, is considered by the model to be of less importance than the financial success of the physical vehicle that it might be contained within, such as the book.

Thus there have been complex and evolving mixes of vested interests who have controlled, or have had desire to control information and knowledge, or the systems of knowledge storage and transfer. There is no reason to think that this may not continue. Society today includes a mix of multi-national corporations with massive investment in the knowledge distribution networks, the coming of age of digital technology, whole communities of multi-media-enriched individuals, the Internet, Microsoft, the advent of Google, and so forth. If advanced societies are to be increasingly dependant on knowledge, skill levels and ready access (OECD 1996), then there may be vested interests and/or economic opportunities to be protected, or created.

Of significance to this paper is the recognition by the OECD that diffusion of knowledge, knowledge distribution networks, and effective gathering and utilization of knowledge are crucial to knowledge-based economies. The importance attributed by the OECD is supported by others. The American-based Association of Research Libraries (ARL 2000) stated that creation, dissemination and application of knowledge is fundamental to development of informed citizenry. In Australia the Discussion Paper 1375.0 (ABS 2002) on measuring knowledge-based economies and societies discusses how knowledge flows around innovation systems (p. 5), networks to enable knowledge to flow easily (p. 5), the importance of fluidity of knowledge flow (p. 8), and the central importance to the development of knowledge-based economies of the skills and knowledge of people living in society (p. 17). It is the knowledge transfer process that is at the heart of such flows and systems.

The evolutionary path towards the current focus on knowledge based societies has many milestones and turning points, some of which may be indicators to where that path may lead into the future. While a paper such as this cannot hope to cover all important events I contend that the current ‘state of play’ is predominately influenced by profit motivations. In order to arrive at this juncture, the paper adopts a selective historiography approach, to illustrate the importance of vested interests (some of which may have had reasons other than profit for impacting the availability of information) before considering how business models in the contemporary environment may be able to significantly influence knowledge creation, dissemination and flows.

**Knowledge**

Burton-Jones (in ABS 2002, p. 1) defines knowledge as "[i]nformation and skills derived from use of information by the recipient", and suggests that data is a signal sent to a recipient, whereas information is intelligible data sent to a recipient. One could question whether ideas or data are information, whether information is knowledge, or where the transition from one to the other takes place, but these issues are not within the scope of this study. I will commence from the basis that ideas and information can be considered as knowledge if in a form available for dissemination, is desired by others, and can be utilized by the recipient.
Goldman (1999) asserts that information seeking is a pervasive human activity and that the elemental universal social path to knowledge is the transmission of observed information from one person to others. Buckland (1991) contends that information systems are embedded in social environments, being informed is a state of knowing and becoming informed denotes a change in what we know. These, and other authors, connect knowledge with societal desires for knowledge dissemination. Dissemination needs vehicles to accomplish the task of dissemination.

One could argue that, in a modern society, information transfer between individuals is potentially knowledge only when that knowing outlasts and goes beyond the individuals involved. Therefore an idea becomes information through being sought, or received, by others and being transmitted (disseminated) to yet further others. The process of transmission, the act of transference and its insightful receipt becomes a state of knowing (knowledge). Thus information seeking and information transmission is a societal process where the transfer is aided by information systems integral to society itself. One could also argue that knowledge creators and knowledge seekers have been fundamentally reliant on third parties to provide storage and dissemination mechanisms and that the process of knowledge could not work substantively without those third party processes. Whilst a verbal face to face discourse between two scientists or academics requires little to no third party intervention, such discourse over distance or a wider sharing of that discourse needs the intervention of storage and transmission vehicles and organisational supply structures and infrastructures. This requires knowledge creators, processes of knowledge storage (control), processes of knowledge transfer (dissemination) and knowledge seekers. Where the process of storage and dissemination is provided by outside parties the possibility exists for the interests of those outside party providers to have precedence over the interests of those prime parties to knowledge, the knowledge creators and knowledge seekers.

Such social processes are founded on objective inquiry. Fay, quoted in Budd (2001, p. 241) stated a process of inquiry is objective when it is fair in the sense that its procedures and the judgements it underwrites are responsive to the evidence, is responsive to other possible interpretations of this evidence, and results in superior conclusions which should be revised or abandoned if later works warrant it. Thus knowledge, once authenticated by objective inquiry, remains valid until challenged by new authenticated knowledge. The adage “knowledge begets knowledge” can be seen to have significant relevance to this thesis as it reinforces the need for knowledge storage and dissemination vehicles.

Steyn suggests a new equation where knowledge is power and therefore share it to make it multiply (2003, pp. 514-531). The use of knowledge allows the ongoing development of an informed society by replacing ignorance through the creation of a mental info-sphere holding the sum of all beliefs. That info-sphere contains beliefs that are held to be true when tested by reliable justifications and through reliable mechanisms and these beliefs are created, disseminated and applied in the search for new knowledge. “(T)he practical usability of the message infosphere depends on organization; this is critical to the role of print in knowledge enhancement.” (Goldman 1999). Such a

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3 Goldman (1999) refers to the sum of all beliefs as the info-sphere.
mental info-sphere cannot exist in thin air. Its many parts cannot be tested and judged reliable by any mechanisms, nor can it be added to, unless there are processes of dissemination and processes that manage or control that dissemination. Traditionally that has been through the written word and the huge expansion of knowledge during the last 550 years has been stored and disseminated primarily via the printed book.

There are many definitions of knowledge management by multitudes of authors, and one overarching part of the knowledge management environment is what I would call a physical space - the system, whether it be systemising information, or alignment with organisational structures (business, faculty, research group and so forth). In these scenarios the organisation is both the cause and the reason for the management process, it provides the storage of already created organisational knowledge and it provides the impetus for organisational members to both use that stored knowledge and create new organisational knowledge. Knowledge creation is thus focused by the needs of organisational processes. This view about knowledge management from an organisational perspective in my opinion detracts from the power that knowledge demonstrates to be managed by societal interests, once given an opportunity to exist. I suggest a model where societal processes themselves exercise influence through sectarian, state and business models. Given that knowledge is powerful intrinsically history suggests persons and organisations seek the power to manage and control knowledge. Knowledge management or control of knowledge has been exercised through mechanisms that decide what knowledge will be stored and disseminated and what knowledge will not. If a societal model based on sectarian or state beliefs limits the dissemination of some knowledge and encourages dissemination of other, more acceptable knowledge then that is control, and in effect is knowledge management. If a societal model based on profit/cost analysis determines what will and will not be published then, unwittingly, that is also control by exception, and in effect is knowledge management.

The book has been a prime vehicle of information, ideas and knowledge and it, and its distribution networks, has been a sustained target of control.

### 3.0 Pre-Gutenberg Knowledge Diffusion and Distribution

Whilst the codex book became the dominant form of preservation and transmission of the written word in the west nearly a millennium before introduction of movable type (Hesse 1996, p. 22), one could argue that modern mass diffusion and distribution of knowledge began with Gutenberg's re-invention of moveable-type. Whether based on a printed-book, scribed codex, papyrus or parchment scroll, or more ancient imagery processes, information and knowledge has, since very ancient times, been stored and made available to others through the technology of its historical period. These are devices for storage, diffusion and distribution.

Geiselhart (2001, p. 199) suggests the desire of early man to store and revisit information led to a progression from rock paintings to abstract representations on rock and clay, pictographic writing, and the invention of phonetic and alphabetical systems. The book, Geiselhart suggests (2001, p. 199) has always been linked closely to its production technology with even the Chinese ideogram for a book, the signs for a brush
and bamboo strip, evolving from the technology available at the time. Man (2000) discusses Minoan pottery discs from 1700 BC found with clear indentations of printed signs not drawn but made by hard stamps. Thus it is almost certain that primitive cave paintings, scratches on tortoise shells, impressions in soft clay and so forth, represent information and knowledge by knowledge-creators for target audiences. But the diffusion and distribution of the messages contained within such images would have been extraordinaril}

Mass knowledge storage, though not mass distribution, became a reality with the introduction of ancient libraries based on scrolls. Jacob (2002, p. 41) believed the first appearance of libraries suggested faith in the power and value of books as repositories of practical, technical and theoretical knowledge "(of wisdom and truth, of a particular state of the language and a social memory". Whilst Jacob uses the term 'books' it is not unrealistic to give the same meaning to the scrolls of antiquity held in ancient libraries. I suggest that storage, not distribution, was the prime strength of ancient libraries. Scrolls are difficult to catalogue, index and so forth for ease of use. A book is not so much a product but an information architecture of title, attribution, content, chapters, headings and sub-headings, references and index, all placed within a world of other books in sophisticated cataloguing systems (Cope, 2002, pp. 2-3). Few if any of these descriptions of how a book operates can easily be ascribed to ancient scrolls, thus diffusion and distribution of knowledge via scrolls would be limited, compared with the structure of books.

Nevertheless, in A.D. 641 The Library of Alexandria was reputed to have contained in excess of 1.2 million scrolls (Battles 2004). 300 years later the libraries in Muslim-dominated Spain contained between 400,000 and 600,000 scrolls and scribed codex (Battles 2004, p. 65). Such massive collections occurred before the advent of the printed book. Storage of knowledge existed on vast scales however its dissemination was severely limited by low literacy levels, unsophisticated cataloguing systems, and the particularly tedious scribing method of making multiple copies. Thus most seekers of knowledge would have had to travel to one of those libraries, coped with the difficulties of identification, search and retrieval, and then absorbed the contents of one of only a handful of copies of the desired scroll or codex.

Such massive Islamic collections occurred at a time when the largest libraries in Christian-dominated Europe each numbered in mere hundreds of volumes (Battles 2004, p. 65). The great European libraries were based on codex production originating from the many sectarian monasteries in the western world. During the middle-ages such monasteries were the centres for the spread of agriculture and the creation of new wealth (Smart 1993, pp. 270-271). They were also centres for the growth and storage of Christian writings. Supply was limited by the hand-scribing technology in use, the use of Latin, and a market limited to those of a western religious persuasion or of wealth and status. The Christian Church was a prime focus for dissemination of knowledge in the Western world.
Post-Gutenberg Knowledge Diffusion and Distribution

Scown (2002, p. 77) suggests that ever since its earliest configuration in ancient Greece the University has "acted as the principal agent in the production, collection and dissemination of knowledge". I do not entirely agree with this statement, at least for the middle ages up to the introduction of the Gutenberg technology. During that period the monasteries were the prime centres for codex production, and in the early years following the development of Gutenberg's press most printers were established, not in university towns, but in centres of commerce (Febvre and Martin 1979, p. 251). Printeries were set up, in the initial stages, not for the spread of knowledge but for profit. Although most printed output in those days was usually religious in nature, approximately 10% of the output was in genres that might be called 'scientific' (Febvre and Martin 1979, p. 218). One can only speculate if even this modest scientific output, combined with the growth of a discerning and increasingly affluent reading public, was a prime factor in the massive growth and dissemination of knowledge in the decades and centuries following Gutenberg.

It is hardly coincidental that the great western libraries and universities flourished consequent to the development of the Gutenberg press. Jacob (2002, p. 41) believed the first appearance of libraries suggested faith in the power and value of books as repositories of practical, technical and theoretical knowledge "(of) wisdom and truth, of a particular state of the language and a social memory". He suggests a library, as an accumulation of books, creates special effects that cannot be duplicated by the cumulative effects of each book in isolation. Jacob's views are perhaps western-centric.

"If the fundamental purpose of the university is the acquisition of knowledge for its own sake, as well as the dissemination of that knowledge for the sake of the community, then we need to consider the conditions under which these purposes could be realized" (Miller 2000, p. 115). Miller is supported by Goldman (1999) who suggests that the promotion of knowledge is the fundamental aim of education, and that education seeks knowledge that is new for individual learners. In my view such purposes and aims could not have been adequately met without the invention of the codex and the subsequent expansion of the influence of the codex via the printed book. However, care should be taken not to focus on the book itself rather than the knowledge contained within. Even John Locke in the 17th century, as cited in (Hesse 1996, p. 23) was aware that fixing the form of the book tends to reify its contents.

The ideas of great philosophers were able to be suddenly mass-disseminated to an increasingly literate and knowledge-hungry society. Another "epistemological acts and threshold" circumstance might have been the rise of university institutions as Goldman (1999) claims. Whilst the printing press had enormous impact on the message infosphere, technology was not the only communication systems facet affecting communications of knowledge. Goldman considered that institutions and their organisations played equally important roles with the systematic cataloguing principles of scholarly libraries playing pivotal roles in knowledge expansion by cultural transmission (Goldman 1999).

5 Printeries using the Gutenberg moveable-type printing technologies were well established throughout Europe by 1500 AD.
Books have been the key vehicles to facilitate knowledge management and the spread of knowledge. Cope (2002, p. 1) states that in the second millennium it is the book that has most defined the shape of the modern world. Books have become the basis of modern mass literacy and mass education, modern democracy and consciousness.

**Post-Gutenberg Attempts at Knowledge Control**

Davenport and Prusak (2000, p. 5) argue that knowledge is highly dynamic, is moved by a variety of forces and is the most sought-after remedy to uncertainty. It could also be argued that the uncertainty of the consequences of knowledge is a dynamic force for control of that knowledge, and control post-Gutenberg became a tangible and powerful process. This control process has been deliberate and has historically been achieved by sectarian and state efforts to control ideas by controlling the book and the industries (knowledge distribution networks) associated with it. Hannabuss and Allard (2001) see the systematic control of ideas as part of wider ideological, political, religious and social censorship, with laws still in place today to prevent harm to the state (sedition), and to protect the views of religious majorities (blasphemy), as well as laws to control other social issues. Religion has been a powerful force in the ebb and flow of control over the content and accessibility of books. Similarly state control, often with a religious focus, has impacted the development path of books, complicated by issues of influence and profit. In western societies technology provided opportunity for church and state to exercise power on a grand scale, but also created opportunity for those outside these power centres to disseminate dissenting viewpoints. The control of massed knowledge has given power to dukes, merchants, popes and others (Battles 2004, p. 72), and they exercised that power. This was a particularly western European aspect of society with the Muslim dominated east being more liberal to the flowering of knowledge.

**Sectarian Control - post Gutenberg**

In the decades following Gutenberg's first press, printing spread throughout Europe (Man 2003, p. 60). At first The Church could no longer assume the controlling role it had in the age of manuscripts when it supervised the content, creation and distribution of texts, because economic issues of capital and skilled artisans were beyond the resources of any monastery (Febvre and Martin, 1979, p. 172). The Church still had significant influence over the content of a large sector of the book market, but there was much diversification in suppliers of books from sources and market segments other than just religious tracts. Printing allowed religious bodies, kings and the states to widen their influence and control over the populous, but at a cost because it allowed the challenge ideas and knowledge not acceptable to those same powers to also be disseminated. Halsall (Sept 2004) on the subject of the Censorship of Books suggests that when the spread of spread of reading which was "highly detrimental to the public, competent authorities were obliged to take measures against them". One need not imagine for too long or too deeply who would be considered competent authorities; those persons sanctioned by the sectarian interests with power to control. Numerous examples of religious censorship are provided by the French historians Febvre and Martin...
and publishers), readers of pernicious books, the suppression of dangerous publications, threats to the faith or to the authority of the Church, excommunication as the punishment for publishing any book without approval, and so forth. From 1520 the Lutheran Reformation created significant printed text output to push its reforming sectarian cause in Germany and the Catholic Revival or Counter-Revolution had similar effects after 1570 (Febvre and Martin, 1979, pp. 192-193). The printing press was used by competing sects to push their views and to influence and then control the wider populous.

During the seventeenth century the English Civil War saw massive printed propaganda with religious and political tracts widely distributed (BBC, 2004c). This would have given the English printing industry rapidly increasing capacity that needed to be turned to other purposes once conflict died away. It is also likely that this capacity generated a ready supply-chain for the flowering of knowledge and scholarly thought that occurred in the seventeenth and eighteenth centuries. For example 1667 John Milton's Paradise Lost and in the 1680s John Bunyan's The Pilgrim's Progress (BBC, 2004c), were both published during this period of increasing spare print capacity.

The fear of uncontrolled knowledge drove insidious and pervasive forms of sectarian control over knowledge-based economies.

Secular Control – post Gutenberg

No less pervasive than sectarian influence was State control over printing and publishing. This commenced at the same time as religious censorship but continued after sectarian attempts at knowledge and ideas control diminished. The two most powerful western kingdoms of the era, England and France, had printing processes well established within a few years of Gutenberg's invention. Whilst sectarian battles were being fought to control the minds of the people based on concepts of 'absolute truth', other powers, such as kings and the state, had their own agendas of control from more secular perspectives.

Examples include Richard III of England imposing restrictions on imported books (Berry and Poole, 1966 p. 53); proclamations in 1486/87 for suppressing of "(f)orged tidings and tales and seditious rumours and for the discovery of the authors thereon" (p. 59); the prohibition of the importation of books to protect local English printers by Henry VIII of England (p. 85) (no doubt because thus the English printers could be more easily controlled). This issue was not restricted to England. In 1563 Charles IX of France required every book to be licensed before publication based on advice from a group of censors giving him control over every new book. At first these censors were theologians but later in the 17th century were secular officials (Febvre and Martin, 1979, p. 246).

Penalties for offences against the State and aimed at printers, publishers, and importers of books, were severe. In 1549 there was a proclamation concerning "Any sower of seditious acts to be sent to the galleys to row in chains as a slave" (Berry and Poole, 1966 p. 88), and by 1555 execution became the official punishment for seditious acts (p. 92). One could be excused for thinking that, in England at least, the abolition of the Star Chamber on 5th July 1641 (Lonang Institute, accessed November 2006) would...
have enabled the free flow of information. Yet in 1643 the writer William Prynne was pilloried, fined the enormous sum of 5000 pounds sterling, had his ears cut off and was imprisoned (BBC, 2004c). Then in 1647 he was again fined a similar amount and branded SL (for seditious libeler) on each cheek (BBC, 2004c). Facial disfigurement and huge fines did not deter this printer, suggesting that economic or other rewards were so significant that it was well worth printing in defiance of the state. Probably the ultimate fate meted out to a printer/publisher was in 1664 when John Twyn, printer, was sentenced to be hung by the neck and then, whilst still alive, to have his 'privy-members' removed followed by his entrails (Berry and Poole 1966, p. 134). Twyn's crime was that of printing a 'seditious, poisonous and scandalous book'.

In this post-Gutenberg era it is likely that a burgeoning middle-class and increasing literacy provided an insatiable appetite for knowledge. The potential for financial rewards in the form of profits and taxes is unlikely to have been ignored by the State. So the encouragement of select printers that could be controlled and the prevention of other printers from operating became another method devised by kings and the state to exercise control over the knowledge and ideas disseminated. In effect a new business model had been created which allowed for dissemination but gave effective control to kings and state through royal patronages to print, with conditions, and the protection of those patronages through application of harsh punishment (Berry and Poole 1966).

Whilst it might be convenient to charge religious groups, monarchs and states with accusations of censorship and control of knowledge through their attempts in the past to control of books, sadly there are many such examples of a more contemporary nature. For example in 1914 the German army destruction of Belgium university city of Louvain and its priceless library of 70,000 volumes of 500 years uninterrupted intellectual life (Battles 2004, p. 159). The Louvain library and collection was rebuilt with American aid (p. 159) only to be destroyed again in 1940 by a new German army (p. 161). The Nazi burning of 'undesirable books in the 1930s is reputed to have destroyed over one hundred million books over a twelve year period (Battles 2004, p. 167). Hundreds of thousands of books and manuscripts did not survive the Chinese invasion of Tibet in the mid to late twentieth century (p. 179). In 1992 the Bosnian National and University Library, containing some 1.5 million books was targeted by Serbian artillery fire and destroyed (p. 185).

Destruction of libraries is not the only contemporary use of control of books to control and deny use of knowledge. Black-American author Richard Wright describes being denied access to southern American libraries because of his colour and of being harassed by library officials even when visiting on 'errands for whites' (Battles 2004, p. 181). In 1936 Georgia had fifty-three libraries of which only five served blacks, Florida had forty-four of which blacks could only use four and such patterns were repeated in other American states (Battles 2004, p. 183).

The Effect of Business Models – post Gutenberg

Even where libraries have flourished uninterrupted there are still forms of control within their operations that have impact on knowledge dissemination. For example Harvard has the largest academic library the world has ever known with some 14 million titles.
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The Book-Printing Business Model is simple with high fixed and low variable costs. To bring an Australian perspective, volume-hungry technology has driven each company in the publishing industry to a constant search for the volume such technology demands (Burch 2002, p. 183). Higgs (2002, p. 63) defines the traditional mass production business model as having a base line minimum order quantity of 2,000 books, and modern traditional book production technology is extraordinarily efficient at producing huge numbers of titles and copies per title. Mass dissemination of knowledge is available for those titles that fit the high-volume economic model. Publishers have had effective control over what knowledge has been widely disseminated (published), and whether such publications remained in print.

That is a form of control of knowledge through application of an economic business model.

**Information and Knowledge in Today's Society**

Knowledge in today's society is increasingly delivered in digital environments. Examples include digital journals, open-access, communities-of-interest, creative-commons, new forms of university publishing, and above all the Internet. This is recognized by Scown (2002, p. 87) who suggests distributed learning systems enable digitized communications without time and place boundaries, creating new possibilities.

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6 A number of technology and industry statements made in this paper are the opinion of the author, based on an extensive managerial background in the printing and publishing industry.
The Availability of Information

for academic publishing where everybody can become an author. The role of the academic is broadened into online publishing, the role of students is broadened through peer networks that co-create knowledge for each course or program, and research and scholarship become more public as academic authors publish, critique and are critiqued in public domain spaces.

Hyldegaard and Seiden (2004 p. 2-4) discuss personalization as a new design philosophy focusing on delivery of contextual user experiences where information is gathered from interaction with the user and then used to deliver tailor-made content and service. These and other changes are inevitable if one accepts the conclusions of a meeting of American Vice-Chancellors held in 2000. At that meeting American academic leaders created a set of principles for emerging systems of scholarly publishing (ARL 2000). They were primarily concerned that, whilst the creation, dissemination and application of new knowledge was fundamental to the development of informed societies, the current system of scholarly publishing was too costly to sustain, making it impossible for libraries and institutions to support the current and future printed collection needs of faculties and students.

Textbooks once dominated higher education, but teaching and learning academies are being forced to re-conceptualise academic requirements of academic publishing (Scown 2002, p. 83). He suggests students trained to think will no longer rely on prescribed texts but will use technology to "grab glimpses of many texts" and conventional academic publishing models will become redundant (p. 83). James and McQueen-Thomson (2002, p. 13) believe the changing nature of knowledge means we "are witnessing the emergence of a new dominant mode of enquiry" and that the "dominant way in which knowledge is framed and disseminated is now, as 'information capital'. In Burch (2004, p. 29) I suggested that there were challenges to the hegemony of printed books in Australian tertiary education through forces entirely outside the 'book-industry's' control. I concluded that

Economic rationality in the tertiary sector is driving new forms of delivery for academics, choices of delivery processes for students and greatly expanded research capabilities. Also delivery of knowledge in the scientific journal sector has also greatly expanded new forms of delivery. For both sectors these new delivery processes are all online. Academics, students and science are increasingly working, studying and researching in a flexible and effective online environment where the traditional printed book becomes inflexible by comparison.

Scholarly publishing is rapidly moving towards digital forms. James and McQueen-Thomson (2002, p. 22) suggest "in the area of scholarly publishing, journals have become more important than books and are the preferred form for presenting the vast majority of new research". Consequently the authors believe libraries spend increasing proportions of funds on a diminishing number of periodicals, leaving less money for monographs. Digitisation and ease of access to information is changing the role and influence of the traditional library structure. The modern search for information and knowledge by the net-generation is predicated on the twin needs that it could be quickly

and freely avai...
The role of the aca-
demic publishing (Scowen-
er 2000) is broadened through
knowledge management forms of con-
trol, based on the physical attributes of the printed book, must decline as the volumes of academic books in printed form declines. New forms of knowledge management control may arise. The effectiveness of traditional publishing branding of academic material is now under threat from processes such as:
- Internet access and student use of it as a source of primary resource material bypasses traditional distribution networks and branding.
- Traditional models of academic publishing branding based on quality and authority has traditionally meant high barriers to new entrants. The new business models of digital journals and more recently the Internet, have low barriers to new entrants. The net-generation student is unlikely to be conversant with traditional brand images and may treat all online content as being of a similar standard.
- The delivery of mixed-content by lecturers enhances student exposure to ranges of thinking, but neutralises the efforts of authors and editorial staff to present a cohesive and complete body of research. Content mixing of snippets of information may impair student access to other information in the publication that is integral to the text extracts they have been given to study. Content mixing combines material from a range of sources and as a consequence content under such conditions is of variable value.

Cope is more direct. "The book as we have known it is dead. Long live its information architecture (Cope 2002, p. 19). Cope suggests we are on the edge of a second revolution with the traditional separation of text and image being replaced with the seamless integration of bit and pixel equally capable of both character and image creation, in effect a revolution where visual culture is revived and the written textual culture becomes more integrated with visual culture (Cope 2002, p. 5).

The rise of the multi-national publishers aggregating and conglomerating publishing into super organisations also changes the way knowledge is published, owned and controlled. The publisher almost invariably owns copyright to the intellectual property inherent in published material. Yet Covey (2003, p. 151) suggests that 95% of all books ever published are still subject to copyright however only 3% are still in print. The likelihood that much more than a small fraction of such out of print books can be found in a large number of libraries is low. Thus almost all published books are still subject to rules of ownership and yet are virtually unavailable to the vast majority of the reading public. Many scholars and academics support free-access environments where knowledge is shared freely, or creative commons where ownership is not based on a rights reserved but on new concepts of some rights reserved. The prime consideration being to free up public use of knowledge and maximise dissemination, whilst giving the author full attribution. A commendable altruistic objective unlikely to find favour with the present copyright owners of the 95% of material currently out of print, and one disregarding who will set up and maintain the systems of storage, availability and distribution and who will pay for such systems. Digitisation of out-of-print books is one solution to resolve out-of-print availability issues however, this solution is complicated further by copyright concerns. Has the publisher released rights back to the create...
Were digital rights joined to print rights or held separate? Who is the current rights owner if the creator has died? Such issues may be time-consuming but are not insurmountable. Also it is appropriate to consider what administrative effort is required to resolve rights permission for, say, one thousand, or a million, or one hundred million books? While solutions have yet to be found such questions are at least on the agenda. It seems clear however that creative rights are still protected in real terms more so than at any time since Gutenberg.

**Who Might Control Information and Knowledge?**

"Power, in the coming era, belongs to the gatekeepers who control both access to the popular culture and the geographic and cyberspace networks that expropriate, repack­age, and commodify the culture in the form of paid-for personal entertainment and experiences" (Rifkin 2000, p. 177). I suggest that those organisations in the entertainment, info­tainment, search, telecommunications, education, personal management, software and similar industries, are either providers of access or will themselves become targets of providers of access. Each of these industries is already, or is likely to be, significant players in knowledge-based economies.

This paper illustrates how historically vested interests have controlled, or attempted to control information and knowledge, either with deliberate intent, or unintentionally through economic models. The church, the state and business remain powerful influences on society and will continue to promote their own agendas and find ways to benefit from information, ideas and knowledge that flow in knowledge-based economies. Any comprehensive review of future influence on availability of information and knowledge is beyond the scope of this paper, however for illustrative purposes some examples follow.

In America handfuls of people taking control of School Committees, Curriculum or Book-Panels have demonstrated ability to change science curriculum’s in State schools to push ideology (Orr, 2005). In Australia individual Senators, newly appointed and with government balance-of-power opportunities have demonstrated potential ideological influence over other political parties (Milne, The Australian Nov 2006). The potential is there for ideological influence or power over information or knowledge in society.

One might argue that as the Gutenberg press met the conditions of Foucault’s (1972) theory of “epistemological acts and thresholds” so also might the advent of the google be of a similar momentous impact on knowledge and dissemination and storage. Google has 45% of the US search market and had revenue of US$4.2 billion in the first nine months of year 2005 (The Australian Financial Review, 23/11/05). The avowed mission of Google, according to co-founder Sergey Brin, is "(t)o organize the world's information and make it universally accessible and useful" (The Australian Financial Review, 23/11/05). Almost 50% of the 5.1 billion internet searches in October 2005 were via Google (The Age 27/12/05). Google has personal implications as the teenagers in my house google for information rather than use an extensive and very comprehensive reference library situated metres from their keyboards. Both postgraduate and undergraduate students that I teach are preferential users of search engines for research, and are seldom physical library users. It is likely that both groups are unaware that "1 percent of the Googling is free access regime for music and com generation, an n knowledge. Th But Googling is subject to traditional th a four-party me service. The ad wealth accumu potentially be u Who controls ti is any guide. Ti It would also se who desire Net streams where be available derives from th mote the deploy a sell-out of that governmen tant knowledge
Googling is free, or at least perceived to be to users, and not so different from the open-access regime proposed by many academics and scientists. This is also true of many music and computer games that are copied freely, frequently and illegally by the net-generation, a multi-media-rich generation who are the future creators and users of knowledge. This generation’s concept of fair value is that it comes at little or no cost. But Googling is not free of cost, and the infrastructure behind it is capital-intensive and subject to economic business models just like any other for-profit business. The traditional three-party business model of creator to supply-chain to user is becoming a four-party model with the inclusion of a fourth-party, an advertiser, who funds the service. The advertiser pays the gatekeeper and provides the source for most of the wealth accumulated by the gatekeeper. This represents economic power which can potentially be utilized in influential ways.

Who controls the Internet itself is a significant issue, if recent international posturing is any guide. The recent United Nations sponsored World Summit on the Information Society saw a battle between EU and American bureaucrats over who would control the Internet in the future (The Age, 17/11/05). The EU Commissioner had questioned the appropriateness of one country supervising such an important infrastructure, but the eventual decision was that the US Government would continue to do so. From an obscure scholarly communications beginnings the Internet is now of such importance that governments fight over who should control it. Political power over such an important knowledge vehicle is clearly contentious.

It would also seem that the Internet itself is subject to a power struggle between those who desire Net neutrality and those who desire that it be split into different data streams where differing qualities of service can command a different pricing structures and be available only to those that could afford it (The Age, 21/11/06). The debate derives from the passing of the US Congress Bill No. H.R.5252 in June 2006 to promote the deployment of broadband networks and services. Critics of this Bill see it as a sell-out of net neutrality with over one million Americans petitioning the US Senate to "(s) tand firm against efforts by phone and cable companies to control the internet" (Aaron, accessed November 2006). It is thus evident that the potential for the application of economic power over availability of information exists.

Microsoft is experimenting with recording on vast databases, visually and orally, virtually every facet of one of it's researchers lives, from profound events through to the most insignificant, a task Microsoft admits is a challenge to the companies programmers (The Age 5/01/06). What is unclear is the motive of Microsoft for this project, however, it is likely to be an economic one. In the same article Nack, a researcher at the Amsterdam Centre for Mathematics and Computer Science, is concerned with the social implications where "[i]f everything we do is recorded for scrutiny, it can hinder social development ... surveillance of the people, by the people, could lead to an unsettling society of conformists". This could become a societal issue long-term although it is difficult to assess where such technologies might lead to. Microsoft strategy is more likely to be for economic gain rather than for altruistic purposes. The potential product
s information at an unprecedented level of detail about how an individual lives ... or how groups of individuals live ... or even how groups interact within societies. The availability of such information could become an economic resource in a number of ways, or an information resource for political purposes. The ultimate possibility could be a knowledge-based society and economy in networked form. That, would be economic and political power of some significance.

During 2004 Google set out to scan millions of books contained in several major libraries, but this activity is subject to legal challenge by publishers and authors re the copying of copyright-protected material without permission (The Australian Financial Review, 23/11/05). Earlier in this paper I quoted Covey (2003) that 95% of all of all books ever published are still subject to copyright however only 3% are still in print, and it is this vast out-of-print resource and the high-growth digital journal market that I suspect is driving decision-making in the traditional publishing arena. Five international publishers dominate the Science, Technology and Medicine (STM) publishing market (Wilev 2004), and are the result of merger and acquisition activity that has increased dramatically in recent years. Falk (2003) suggests that Reed Elsevier alone owned over 1500 journals in 2003 and had acquired more than 400 journals in the year 2000. The Reed Elsevier website (2005) suggests that their stable of STM journals now exceeds 1800. Falk suggests that publishing mergers have had anti-competitive impact with STM journals increasing in price uncontrollably. Goldman states the informational demands of scientific and scholarly communities are outstripping traditional resources (1999, p. 173), and that journal prices have soared 400% over 20 years and books and monographs increased by 40% in 5 years. Goldman is supported by Houghton (2000) and McQueen-Thomson (2002) who make similar statements. That, is economic power.

Conclusion

It is clear that control over information and knowledge through the ages has impacted both the content and availability of knowledge. Historically, identifying those who desire to control or have controlling influence was more transparent than it is today. Also advances in technology provide opportunities for every net-connected individual to ‘publish’ their thoughts online and thus substantially widen the range of quality and ‘worthiness’ of the content of the world-wide info-sphere.

Two issues (although there are many others) are identified in this paper. The first is the economic business model being used, and a decision by a publisher not to reprint an existing title usually meant that it no longer met that economic model by virtue of perceived insufficient interest in the material by the market. But new paradigms of information and knowledge dissemination, new standards of knowledge search and retrieval, a proliferation of available information, are changing how the voracity, reliability and pedigree of knowledge and its provider. For example the widespread use of embryonic stem cells, the ability for a knowledge-based society and economy in networked form.

The second issue is that the ideology and traditional ideological agenda ofintelligence and knowledge shall be protected from even peer-reviewed digital archives are powerful revenue for potentially influence mined. Even extraordinary the quality of content, product, and are not even peer-reviewed digital archives are powerful revenue for potentially influence mined. Even extraordinary the quality of content, product, and are not

The above two issues are key issues for vested interests to co and knowledge is significant.

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reliability and pedigree of knowledge-creators and their product is scrutinized. The net-
generation exist in media-rich 'for free' environments and that is reflected in their undiscriminating research patterns.

The second issue is that vested interests as influencers, and therefore potential for control strategies, is a now much more complex environment. The traditional marketing of ideology and traditional economic business model environments are changing. The religious agenda of 'intelligent design' is marketed as science. The digitization of information and knowledge challenges publisher organizations whose products have traditionally been knowledge vehicles, not the knowledge itself. The new researchers and future creators of knowledge are growing up in a 'for free' environment. Yet nothing is free, at least not in the long term. Whoever financially supports websites, or search engines, or even peer-reviewed digital journals, has vested interest. Advertisers and other interests are powerful revenue creators for search organizations such as Google and thus have potential influence on content, the veracity of which is no longer easily determined. Even extraordinarily authoritative journals such as Science can be misled as to the quality of content9, and yet many STM journals in the international journal mar-
ket are of lesser authority than Science, have the appearance of publisher marketed products, and are not easy to categorize as to levels of quality and authority.

The above two issues impact the 'quality' of information and knowledge availability and therefore are key issues when considering knowledge-based economies. The potential for vested interests to continue to seek ways to manipulate the supply of information and knowledge is significant.

References


9 Potential does not imply fact or likelihood. However the greater the economic benefit to an organisation or group of organisations the greater the possibility exists that such economic benefits be protected and extended through control or influence strategies.

10 For example the widely published scandal re a landmark paper describing research into embryonic stem cells, that has since proved to be fraudulent.
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